



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|-----------------|-------------|----------------------|---------------------|------------------|
| 10/648,611      | 08/26/2003  | Ronald Scott Smith   | NOVA 9244           | 4386             |

7590 08/10/2004  
Kenneth H. Johnson  
Patent Attorney  
P.O. Box 630708  
Houston, TX 77263

|          |
|----------|
| EXAMINER |
|----------|

NGUYEN, TAM M

|          |              |
|----------|--------------|
| ART UNIT | PAPER NUMBER |
|----------|--------------|

1764

DATE MAILED: 08/10/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

|                              |                               |                              |  |
|------------------------------|-------------------------------|------------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>10/648,611 | Applicant(s)<br>SMITH ET AL. |  |
|                              | Examiner<br>Tam M. Nguyen     | Art Unit<br>1764             |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 26 August 2003.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-15 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-15 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All    b) ☐ Some \* c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                        | 4) <input type="checkbox"/> Interview Summary (PTO-413)                     |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)               | Paper No(s)/Mail Date. _____  |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| Paper No(s)/Mail Date <u>8/26/03</u>   | 6) <input type="checkbox"/> Other: _____                                    |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 112*

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

Claims 3-10, 11, 12, 13, and 15 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 3 recites the limitation "the organic component" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim.

Claim 5 recites the limitation "said nitrogen-based ionic liquid" in lines 1-2. There is insufficient antecedent basis for this limitation in the claim. It is unclear if the ionic liquid in claim 5 is the same as the ionic liquid in line 6 of claim 1.

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1-15 are rejected under 35 U.S.C. 102(e) as being anticipated by Boudreau et al. (US 2003/012559).

Claim 1:

Boudreau discloses a process for separating diolefins (e.g., hexadiene) and/or mono-olefins from non-olefins by contacting a mixture comprising diolefins and/or mono-olefins and non-olefins with a copper or silver complexing compound in a nitrogen containing ionic liquid which is capable of complexing with diolefins to form a salt/metal/diolefins complex. The non-complexed mono-olefins or non-olefins are then separated from the overall mixture. The diolefins are then released from the complex by regenerating. It is noted that Boudreau does not specifically disclose the ionic liquid has a melting temperature below 80° C. However, the ionic liquid of Boudreau is the same as the claimed ionic liquid. It is inherent that the Boudreau ionic liquid would have the claimed melting temperature. (See abstract; paragraphs [0009] to [0018], [0040] to [0049], [0057], [0100] and Table 1)

Claim 2:

The silver complexing compound is silver acetate. See paragraphs [0040] and [0041].

Claims 3-7:

The ionic liquid is 1-butyl-3-methylimidazolium tetrafluoroborate. See paragraphs [0048], [0049], [0090], [0100] and Table 1.

Claim 8:

The mono and diolefins containing mixture can be in the gas phase or in the liquid phase. See paragraphs [0013].

Claim 9:

The regenerating step is consisted of increasing temperature and lower pressure. See paragraphs [0059].

Art Unit: 1764

Claims 10-12:

The mixture and the ionic liquid are contacted in a counter-current flow, a co-current flow, or in continuous stirred tank reactor. See paragraphs [0013].

Claim 13-15:

Since it is optional that the ionic liquid contains water, the amount of water ionic liquid would not be addressed here.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out

Art Unit: 1764

the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-15 are rejected under 35 U.S.C. 103(a) as obvious over Munson et al.

(6,339,182)

Claim 1:

Munson discloses a process for separating diolefins and/or mono-olefins from non-olefins by contacting a mixture comprising diolefins and/or mono-olefins and non-olefins with a copper or silver complexing compound in a nitrogen containing ionic liquid which is capable of complexing with diolefins to form a salt/metal/diolefins complex. The non-complexed non-olefins are then separated from the overall mixture. It is noted that Munson does not specifically disclose the ionic liquid has a melting temperature below 80° C. However, the ionic liquid of Munson is the same as the claimed ionic liquid. It is inherent that the Munson ionic liquid would have the claimed melting temperature. It is noted that Munson does not specifically disclose that diolefins are release from the ionic liquid complex. However, diolefins would have desorbed from the ionic liquid complex as a results of desorbing olefins from the ionic complex. It is reminded that the claimed ionic liquid does not exclude metal salt in it. (See col. 10, lines 47-49; col. 3, lines 8-54; col. 5, lines 53-58; example 2)

Munson does not specifically disclose that the diolefins have a carbon atom number of from C<sub>4</sub>-C<sub>8</sub>. However, Munson disclose that the olefinic feedstock have a carbon atom of from 2-20.

It would have been obvious to one having ordinary skill in the art at the time the invention was made to have modified the process of Munson by utilizing an olefinic feedstock comprising diolefins having a carbon atom of C<sub>4</sub>-C<sub>8</sub> because one skill in the art would use an olefinic feedstock comprising mono-olefins and diolefins having any carbon atom number of from 2 to 20 including C<sub>4</sub>-C<sub>8</sub> with the expectation that any olefins having a carbon atom number within 2 to 20 would provide similar results.

Claim 2:

The silver complexing compound is silver acetate. (See col. 4, line 37)

Claims 3-7:

The ionic liquid is 1-butyl-3-methylimidazolium tetrafluoroborate. (See col. 10, lines 5-39)

Claim 8:

The mono and diolefins containing mixture can be in the gas phase or in the liquid phase. (See col. 5, lines 65-66)

Claim 9:

The regenerating step is consisted of increasing temperature and lower pressure. (See col. 5, lines 53-59)

Claims 10-12:

The mixture and the ionic liquid are contacted in a counter-current flow, a co-current flow, or in continuous stirred tank reactor. (See col. 6, line 1)

Claim 13-15:

Since it is optional that the ionic liquid contains water, the amount of water ionic liquid would not be addressed here.

*Conclusion*

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Tam M. Nguyen whose telephone number is (571) 272-1452. The examiner can normally be reached on Monday through Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Glenn Caldarola can be reached on (571) 272-1444. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

TN

Tam M. Nguyen  
Examiner  
Art Unit 1764

